

# EXPLOSIVES SAFETY

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## PREVENTION OF NAIL GUN ACCIDENTS

During 1992, both the Army and the Navy experienced accidents while using power nailers to block and brace explosives loads. In the case of the Army, accidentally nailing into an ammunition container resulted in the death of the operator and the loss of the trailer and its contents. In the Navy's case the operator was able to escape.

As a result of this experience, the U.S. Army Materiel Command (AMC) temporarily suspended power nailer use around ammunition and explosives and requested a study to determine criteria to assure power nailers can be used safely in ammunition operations. The criteria established are three-fold, involving positive controls on the nailer, safe work practices, and training.

**Positive Controls.** - Power nailers used in ammunition operations must be equipped with safeties to prevent rapid fire operation and require the nailer to be flush against the work piece to prevent accidental discharge of a nail.

**Safe Work Practices.** - If possible, power nailers should not be used in the vicinity of ammunition or explosives. For pneumatic nailers, regulate air pressure to the minimum that will reliably drive the nails. Hold the nailer firmly against the work piece when driving a nail. When fastening floor dunnage, nails must always be driven vertically into the floor. The operator must be provided clear egress at all times.

**Training.** - In addition to any formal training, operators must receive job specific training based on the SOP before using power nailers in ammunition operations.

In addition to the above, the U.S. Army Depot System Command (DESCOM) prohibits use of power nailers within 50 feet of pyrotechnics, items in Federal Stock Class (FSC) 1370.

It is the absolute responsibility of management and supervision to assure that the above are in place. It is the responsibility of each operator to work within these constraints. Controlling operations with power nailers in this manner will prevent further accidents of the type experienced by the Army and Navy last year.

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## DEFENSE ENVIRONMENTAL RESTORATION PROGRAM for FORMERLY USED DEFENSE SITES (DERP FUDS)

The Defense Environmental Restoration Program (DERP) was established by Section 211 of the Superfund Amendments and Reauthorization Act of 1986 and is codified in Sections 2701-2707 of Title 10 of the United States Code. This program addresses the removal and remedial clean-up activities at active sites under the Installation Restoration Program (IRP) and at formerly used defense sites under the DERP FUDS.

The goal of the DERP FUDS is to provide environmental restoration. The program includes clean-up of hazardous, toxic, and radiological waste, unsafe buildings and debris, and ordnance and explosives waste at sites located within CONUS and U.S. territories and commonwealths which were either formerly used or owned by the Department of Defense (DOD), previously known as the War Department.

All potential sites are inventoried to determine if there is an environmental problem attributable to former DOD usage. The inventory procedure consists of a real estate records search to ascertain DOD ownership and/or usage. An on-site visit with the current owner is conducted which identifies any potential environmental problems. Then an Inventory Project Report documenting site eligibility and identifying any environmental problems is completed and submitted to the U.S. Army Corps of Engineers (USACE), Office of the Chief of Engineers (COE) for approval.

Environmental problems could fall within one or more of the following categories.

- **Hazardous, Toxic, and Radiological Waste (HTRW).** Groundwater, soil, etc. contamination which may result in a clean-up program being assigned to a "Superfund" project.
- **Ordnance and Explosive Waste (OEW).** Ordnance or explosives contaminated soil.
- **Containerized/Hazardous, Toxic, and Radiological Waste (CON/HTRW).** Underground storage tanks, PCB-containing electrical transformers, abandoned drums, etc.
- **Building Demolition/Debris Removal (BD/DR).** Hazardous structures, buildings, etc.

Upon approval by the COE, an Archives Search Report (ASR) is conducted. The ASR includes an historical records search and review, site inspection, technical ordnance evaluation, and preparation of a technical report. Based on the ASR findings, conclusions, and recommendations, a remedial investigation and feasibility study (RI/FS) may be conducted to determine if remedial design (scope of work [SOW], site safety plans, and letting of bids) and remedial action (clean-up) should continue.

The U.S. Army Technical Center for Explosives Safety (USATCES) and the Ammunition School located at U.S. Army Defense Ammunition Center and School (USADACS) have been supporting the U.S. Army Engineer Division, Huntsville (USAEDH) in its DERP FUDS OEW mission since FY 92. A memorandum of agreement (MOA) between the two organizations was signed in October 1992. Services provided to USAEDH include those functions detailed under the ASR mentioned above and ordnance training for USACE personnel.

by: Mel Colberg  
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## INTERIM HAZARD CLASSIFICATIONS

We've been asked what is needed for us to issue an interim hazard classification (IHC). This article will communicate that information to you.

First, a couple of things need to be done on your part. You need to ensure your request for an IHC is supported by all available descriptive shipping data. You need to certify the item is rendered safe and in compliance with the procedures outlined in 49 Code of Federal Regulations, Section 173.56.

Then, your request needs to contain as much of the following information as is available:

- (a) Complete item nomenclature.
- (b) Part numbers.
- (c) Identification number. We prefer National Stock Number (NSN), or Foreign Ordnance Material (FOM) number, if available. We can use part number or drawing number if necessary. We are looking for something that uniquely identifies the item to be shipped.
- (d) System the item is associated with. This information becomes important in selecting the Proper Shipping Name.
- (e) Next higher assembly the item is associated with.
- (f) Size of unpackaged item.
- (g) Weight of unpackaged item.
- (h) Explosives composition. A chart or listing of energetic materials is preferred.
- (i) Total explosives weight. We will use this figure as the Net Explosives Weight (NEW).
- (j) Physical description of the item.
- (k) Functional description of the item.
- (l) Packaging data.
- (m) Line drawings (if available).
- (n) Test results (if available).
- (o) Number of independent safety features if the item is a fuze or contains a fuze. We need this to determine the Storage Compatibility Group (SCG).

Finally, we need some information about you. Please send us your complete address. If you use acronyms or abbreviations, we need to know what they represent. A point of contact with a telephone number is very important so that we can easily get questions answered. If you want the IHC faxed back to you, include your fax number and request that we use it. When the IHC is needed by a certain date, so indicate the date. We will be glad to copy furnish other organizations or locations, provided that you give us the complete address. If you want us to fax the IHC to other locations, we will need an individual's name, organization, office symbol, location, telephone, and fax numbers.

We will issue IHCs to Government organizations only and it should be issued to whoever owns or control the item, i.e. product manager, item engineer, procuring contracting officer, etc. Where do you send IHC requests? If your organization or major subordinate command (MSC) has authority to issue IHCs, you should go to them. If you don't know or aren't sure about it, give us a call and we will help you decide. Otherwise, submit your request to Director, U.S. Army Technical Center for Explosives Safety, ATTN: SMCAC-EST, Savanna, IL 61074-9639. Our fax number is DSN 585-8769 or commercial (815) 273-8769. Since we reference the request, we need something in writing!

by: Mark W. Skogman  
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## DEPARTMENT OF THE ARMY EXPLOSIVES SAFETY COUNCIL (DAESC)

The DAESC as part of the Army Explosives Safety Management Program provides the Army Staff and the major Army commands (MACOMs) a prioritization and decision process in the development and execution of Army explosives safety policies and procedures. The DAESC makes explosives safety policy recommendations to the Director of Army Safety (DASAF) and serves as a special investigation council for the Secretary of the Army (SA) on explosives safety issues. It also reviews and approves suggested Army changes to the Department of Defense (DOD) explosives safety standards prior to submission to the Department of Defense Explosives Safety Board (DDESB).

The primary DAESC members are colonels or higher in grade and appointed by the MACOM commander with the MACOM Safety Director as the alternate member. Nonvoting representatives may be invited to provide information or technical advice.

The seventh successful DAESC, chaired by BG R. Dennis Kerr, DASAF, was held on 12 May 1993. The Army EDES, Lt. Gen. Leo J. Pigaty, and representatives from all the designated MACOMs were in attendance. The Office of the ASA(IL&E) was also represented. The topics briefed covered a wide range of explosives safety concerns including: the current status of Army explosives/chemical safety regulations and pamphlets; proposed ASA(IL&E) criteria for short-term/long-term exemptions; proposed authorization to extend waivers past 5 years for contingencies; procedures for waivers for joint service ground operations; and proposed Army quantity distance (QD) criteria for burning grounds.

A draft pocket-sized, soldiers guidebook was distributed for review and comment. This guidebook will make QD and explosives safety easier to understand and apply for the soldier in the field.

Several information briefings were presented to the DAESC: an overview of the explosives safety program in the National Guard Bureau (NGB); DDESB survey results at Army installations; results of a study prepared for the DDESB on inhabited building distance (IBD) criteria; range safety issues; an overview of the Army Environmental Center's (AEC's) responsibilities and activities related to unexploded ordnance (UXO) detection and remediation; an overview of the Spring Valley occurrence in which chemical munitions were uncovered; and a synopsis of the removal response authority in areas that are contaminated with explosives/munitions. Meeting minutes have been prepared, approved, and distributed by the DASAF for use and information.

by: Richard Albrecht  
QASAS  
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## EXPLOSIVES SAFETY INFORMATION DATABASE (ESIDB)

Our ESIDB has gone thru some major changes in the past few months. We now have our ESIDB data on a newer, faster VAX 8820 minicomputer. Because of the new minicomputer, current users of the ESIDB will need to change their modem settings. Parity has been changed from E to N. Data bits have changed from 7 to 8. The new settings in their entirety are 2400, N, 8, 1, N.

by: Bob Carr  
QASAS  
DSN 585-8730

## GLASS BREAKAGE BEYOND INHABITED BUILDING DISTANCE (IBD)

Blast can shatter windows far beyond IBD and personnel injuries can result. U.S. explosives safety standards generally accept this risk and allow blast exposure to buildings around one pound per square inch (psi). Depending on size, windows can shatter at much lower pressures. A recent magazine explosion broke windows offpost at the calculated 0.1 psi region.

In some cases, common sense dictates the window breakage hazard be controlled. For example, an inhabited building containing a large number of people situated in rooms with many windows represents a high level of exposure. Recently, an Army installation planned a new school beyond IBD from an ammunition storage area. If an accidental explosion were to occur, blast would likely shatter the school's windows and many injuries could result. To control this hazard, the Army required blast resistant windows and window frames for the school.

Blast resistant windows can be made of several materials. The best is heat-treated safety glass. TM 5-1300, November 1992, Structures to Resist the Effects of Accidental Explosions, contains a section devoted to the design of blast resistant windows using this material. TM 5-1300 also covers window frame design. The U.S. Army Technical Center for Explosives Safety (USATCES) and U.S. Army Engineer Division, Huntsville (USAEDH) can assist you in applying the TM 5-1300 criteria to your structure.

by: Clifford H. Doyle  
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## TEST PROGRAM UPDATE - PROGRAM MANAGER FOR UNDERGROUND AMMUNITION STORAGE TECHNOLOGIES (PMUAST)

In the June 1992 issue of this Explosives Safety Bulletin (Volume 3, Issue 3), we described the development of the Joint U.S./Republic of Korea (ROK) Explosives Safety Cooperative Research and Development (R&D) Program. This article will update you on the program status and the near-term objectives.

The U.S. Army Engineer Waterways Experiment Station (USAWES), in conjunction with the Ministry of National Defense (MND), ROK, developed a research program to evaluate techniques for reducing external airblast, ground shock, and fragment/ejecta hazards from accidental detonations of munitions stored in underground magazines.

Small-scale tests, using up to 3 lbs of explosives, were conducted at the Big Black River Test Site near Vicksburg, Mississippi. The ROK also conducted small-scale tests at their test site in Taejon, ROK. Test results are now being analyzed and reported on by both U.S. and Korea.

Intermediate-scale tests are planned to further evaluate and refine those concepts determined to be promising during the small-scale tests. An abandoned mine complex near Socorro, New Mexico has been selected as the intermediate-scale test site for this series of explosives tests of up to 2,800 kgs. These tests, to be conducted in late Summer 1993, will simulate accidental detonations of munitions stored underground. The purposes of the intermediate-scale test program are to:

- Confirm or modify the fundamental relations between blast effects and tunnel/chamber geometries established by small-scale experiments.

- Refine these relations based on tests performed under more realistic conditions (e.g., chambers and tunnels in actual rock environments).
- Obtain blast effects scaling measurements that cannot be made at small-scale.
- Confirm blast effects scaling relations for large explosives yields (and large loading densities).
- Examine performance of blast and/or debris control techniques at large (and more realistic) scales.

A series of large scale tests will follow the intermediate-scale test program, to further refine and validate final design concepts.

The results of these experiments, and the end product of the program, will be new designs and predictive techniques for reduction of hazards to ammunition stored underground, aboveground personnel, and structures in the vicinity of the underground munitions storage magazine complex. The program is scheduled for completion in FY 96.

by: Richard Cashin  
QASAS  
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## CONVENTIONAL AMMUNITION RADIATION TRAINING

Recently, the U.S. Army has experienced several unfortunate incidents, involving items containing radioactive material. These incidents have resulted in violations of Nuclear Regulatory Commission (NRC) requirements, substantial fines, and, most importantly, radiation contamination hazards to personnel. To meet an inadequacy of available training in the safety and handling of these radioactive commodities, the U.S. Army Defense Ammunition Center & School (USADACS), will be offering a two week Conventional Ammunition Radiation Training Course.

The course is designed for personnel responsible for the planning and safety of operations involving radioactive commodities and for those who handle these items and provides information on the particular radiation hazards of conventional ammunition, ammunition components and associated hardware. Radioactive commodities encompassed in the course include: U-238 (DU) associated with a variety of DU rounds and armor plating on vehicles, H-3 and Pm-147 found in rifle and light antitank weapon (LAW) sights, Am-241 in M43A1 chemical agent detector, and Ni-63 in the chemical agent monitor (CAM). Instruction begins with atomic fundamentals and extends into an extensive range of topics; supplying students with up-to-date information on the recognition and detection of potential hazards, procedures and methods to ensure safe handling, storage, transportation, maintenance and demilitarization of radioactive commodities, and pertinent regulatory requirements.

Admission is by nomination from the prospective student's command. Registration information may be obtained by calling (815) 273-8931 (DSN 585-8931).

by: Robert D. Wayne  
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## HEXACHLOROETHANE (HC) SMOKE: IT CAN KILL!

HC smoke mixture is used in hand grenades and smoke pots to produce screening smoke on the battlefield. Many training exercises use HC smoke as well.

In the last several years, two soldiers have died after inhaling heavy concentrations of HC smoke. In both cases, the soldiers were in a confined space filled with HC smoke. In the first case, soldiers accidentally ignited an HC smoke grenade in a tent. Most exited immediately, but one soldier stayed behind to dress. That soldier was admitted to the hospital with respiratory problems and died several days later. In another case, a soldier accidentally ignited an HC smoke grenade in a vehicle. He remained in the vehicle to continue his training mission. Three weeks later, he died of acute respiratory failure.

FM 8-285, February 1990, Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries, paragraph 9-4, states:

**"At high concentrations, severe respiratory distress is present which may be fatal...case reports of accidental exposure to moderate and high concentrations of HC smoke have shown a syndrome which includes delayed onset of the more severe symptoms."**

Many soldiers and Department of Defense (DOD) civilians share the misconception that HC smoke is relatively harmless. The two soldiers who recently died could both have easily evacuated their respective heavy HC smoke concentration areas, yet both chose to remain. The resulting exposure killed them both in a delayed reaction typical of HC fatalities. The misconception that HC smoke is harmless must be corrected or more lives will be lost.

by: Clifford H. Doyle  
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DSN 585-8741

## "REMOTE" VERSUS "NON-OPERATOR ATTENDED" OPERATIONS

On occasion we receive site plans/safety submissions which identify an operation as "remote." This connotation denotes an expectation the operator must be protected by the remote operator protection criteria. In checking further with the site plan developer we many times find the operation has been designed to be "non-operator attended." For example an explosives operation where personnel may be exposed to potentially harmful fumes or vapors may have personnel removed from the operation or personnel may be removed based on the cardinal principle of safety. These reasons alone certainly do not require the explosives "remote" operator protection requirements.

Draft DAP 385-46, 13 Aug 93, Ammunition and Explosives Safety Standards, Chapter 18, requires increased levels of personnel protection when the risk of an accidental explosion is above an acceptable level. A hazard analysis or risk assessment of ammunition operations must be conducted to determine the appropriate level of operator protection required. Remote operator protection should be considered for operations involving the drilling, pressing, and cutting of high explosives (HE), mixing and granulating of pyrotechnics, and other such operations. While there is no definitive list of operations requiring remote operator protection, analysis of the hazards is the key. If an unacceptable risk of a detonation or mass fire is determined, then the operator must receive protection from

overpressure in excess of 2.3 pounds per square inch (PSI), fragments with energies in excess of 58 foot-pounds, and thermal fluxes greater than 0.3 calories per square centimeter per second. A more careful use of terminology or explanation in the site plan/safety submission will avoid potential delays in the site plan processing.

by: Lyn Little  
Industrial Specialist  
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## USATCES ORGANIZATIONAL CHANGE

As most Army organizations know, organizational change is the watchword as the Army "right sizes." To best serve HQDA, the major Army commands (MACOMs), and the explosives safety community, two established USATCES divisions, the Development and Production Explosives Safety Division and the Explosives Safety Test Management Division, have been combined.

The Development and Production Explosives Safety Division was originally established in 1987 when the USATCES first originated. The division's mission included: providing explosives and chemical agent safety technical assistance; reviewing and approving DDESB explosives safety and chemical agent general construction plans; participating in accident investigations, and tracking DDESB explosives safety survey findings and abatement actions.

The Explosives Safety Test Management Division was established in October 1992 to accommodate the Army mission transfer of hazard classification from the former AMCFSA. The division's functions were: the U.S. Army's Office of Primary Responsibility for assigning hazard classifications for ammunition and explosives; review Army conducted tests, test plans, and data to establish an appropriate hazard classification; management of the Department of Defense (DOD) Joint Hazard Classification System (JHCS); and manage Army explosives safety testing.

All correspondence previously addressed to the Development and Production Explosives Safety Division, SMCAC-ESP, should now be addressed to the U.S. Army Technical Center for Explosives Safety, ATTN:Explosives Safety Test Management Division, SMCAC-EST. Savanna, IL 61074-9639.

## USATCES HOTLINE

A 24-hour HOTLINE has been established to better serve the needs of the explosives/ammunition community.

Callers are invited to submit any problems, comments, and suggestions to USATCES, DSN 585-6030

DEPARTMENT OF THE ARMY  
US ARMY DEFENSE AMMUNITION CENTER AND SCHOOL  
SAVANNA, ILLINOIS 61074-9639  
SMCAC-ESM

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## POINTS OF CONTACT

The following are the office addresses and telephone numbers to notify when inter-service explosives safety issues arise:

**ARMY:** *The Army has identified two locations. Either is acceptable for notification and proper coordination will follow a request.*

- Office of the Chief of Staff, U.S. Army, ATTN: DASC-SF, Washington DC 20310-0200, DSN: 225-7291/7294, commercial (703) 695-7291/7294
- Director, U.S. Army Technical Center for Explosives Safety, ATTN: SMCAC-ES, Savanna, IL 61074-9639, DSN 585-8919, commercial (815) 273-8919.

**NAVY:** *The Navy has identified two locations. The top address should be contacted for policy issues; the bottom address should be contacted for technical issues.*

- Chief of Naval Operations, ATTN: N411 (OP411), Washington, DC 20350, DSN 225-7094, commercial (703) 695-7094
- Commander, Naval Sea Systems Command, ATTN: SEA 665, Washington, DC 20362-5101, DSN 332-2080, commercial (703) 602-2080.

### AIR FORCE:

Headquarters, Air Force Safety Agency, ATTN: SEWV, Norton Air Force Base, CA 92409-7001, DSN 876-3137, commercial (714) 382-3137

### MARINE CORPS:

- Marine Corps Systems Command, ATTN: AM, Washington, DC 20830, DSN 226-0924, commercial (703) 696-0924.

## EXPLOSIVES ACCIDENT STATISTICS FIRST & SECOND QUARTERS FY 93

TYPE	NUMBER	DAMAGE COST	INJURY COST	TOTAL COST
A	0	0	0	0
B	3	\$906	\$499	\$1,405
C	16	\$339	\$132	\$471
TOTAL	19	\$1,245	\$631	\$1,876

The above explosives accident statistics are a compilation retrieved from the Army Safety Management Information System (ASMIS) Retrieval and Processing System (ARPS) using the search criteria for explosives types. These FY 93 statistics represent explosives accidents reported to USASC on DA Form 285, U.S. Army Investigation Accident Report.

**NOTE:** The above amounts are in thousands of dollars.

The EXPLOSIVES SAFETY BULLETIN targets the ammunition/explosives community. It is printed in Savanna, Illinois. If you wish to submit an article that is of interest to the ammunition/explosives community, or if you have a request for more copies of the bulletin, please forward it to: Director, U.S. Army Technical Center for Explosives Safety, Attn: SMCAC-ESM, Savanna, IL 61074-9639 or call us at DSN: 585-8745, commercial (815) 273- 8745